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CHINA REPORT

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APPLIED SCIENCES

CASE ON STOLEN SATELLITE SECRETS REVIEWED

Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 4, Apr 80
pp 20-21

[Article by Gan Benfu]

[Text] Arming spies with science and using them to steal scientific intelligence is one of the games going on quietly amid international struggles. The following is a glimpse....

One day in November 1978, a young man, 23 years of age, stood as the defendant in a U.S. Federal Court. His name was Kampiles, and he was a spy for the CIA. Strange as it seems, America was actually trying one of its own spies! As it turns out, Kampiles had sold a top secret document to a KGB agent of the Soviet Union for \$3,000.

The document was a copy of the technical handbook for the U.S.'s KH-11 satellite. In his position in the Operations Center Oversight [Overhead] Group at CIA headquarters, Kampiles had access to this top secret material. Although during the course of the trial his defense attorney made a valiant effort to exonerate him, his argument was weak and ultimately to no avail. Kampiles was convicted of treason and sentenced to 40 years! This verdict caused quite a stir in the United States.

What makes one little handbook so valuable? Is there anyone who does not know that there are thousands of satellites floating through space? As it turns out, the KH-11 is not just another satellite. Developed in the United States, it is the most advanced spy satellite in the world today. It can detect and keep watch over the Soviet Union's military deployment, weapons tests, war preparations, and other such important secrets. Furthermore, it can transmit the information to the intelligence center in Washington on a timely basis. The Americans have, therefore, dubbed their newborn brainchild "Keyhole." This is as much as to say that it can see an opponent's secrets by peeping through the keyhole of a tightly locked "door." However, the information thus obtained must be studied and reviewed using various reference materials, and the purloined handbook was the most important part of this reference material. Reading it would tell you the technical capabilities of the KH-11; the intelligence collection mode and the mission of this spy slipping quietly overhead; and you

could also use it to deduce what intelligence had already been gathered and the nature of the information intercepted. Furthermore, as long as this "keyhole" continued in operation, you could use phony set-ups to confuse it, so that the information seen by your opponents through this "secret" keyhole would be worthless. When you think about it, is it any surprise that this caused a public outcry and indignation in the court?

The Secret of 'Big Bird'

Actually, the existence of spy satellites has been an open secret for some time. Hostile parties or potential enemies know that their opponents can use satellites for various spy missions. The only things that are not clear are the specifics about each satellite, such as the purpose of the launch, instrumentation, true horizon, and the modes of obtaining and processing intelligence. Countries do not engage in as much reporting and bragging about their spy satellites as they do with their other spacecraft. On the contrary, agencies in charge do their best to maintain secrecy. For this reason, relevant information is often conjecture or analysis arrived at by relying on indirect means, or even on third party reports or commentary. The present article is no exception, and so it is difficult to avoid imprecision in the figures and some discrepancies in the examples. Nevertheless, it is still quite possible to make out some of the scattered pieces and get some idea of the overall picture.

From early in 1962 until 1970, America's spy satellites passed through three generations of improvement. Models utilizing recoverable film were used for detailed surveys, and had a resolution of 2-3 meters, which was raised to 0.6 meters, and a life of 2-3 days, which was raised to 10-15 days. Radio transmission models were used for broad surveys, and in addition to visible light photography they also used infrared scanners to maintain coverage at night and on overcast days. They also used multi-spectrum photography to recognize camouflaging. At the same time, because the life had been extended to 3-4 weeks, it was possible to reduce the number of launches. For example, in 1965 there were 13 launches, but by 1970 this was reduced to 4.

On 15 June 1971 the launch pad at Vandenberg Air Force Base was again a beehive of activity, as a 17-story behemoth towered on it. This was the Titan 3D launch vehicle and satellite complex, and it was carrying one of America's fourth generation spy satellites. Its official designation was a "low orbit observation platform," code number "467." Its unofficial name was "Big Bird."

This "Big Bird" was indeed worthy of the name. It stood 15.24 meters high, had a diameter of 3.05 meters, weighed 13.3 tons (including propellant), had a surface resolution of 0.3 meters, and was also capable of both detailed survey and general survey missions.

On that 15 June, at 11:41 a.m. Pacific Coast Daylight Saving Time, with a tremendous roar the rocket boosted "Big Bird" into orbit: perigee 184 km, apogee 300 km, angle 96.3 degrees, and periodicity 89.1 minutes. With this

orbit, surface targets were repeated every 3 1/2 days, and with the orbit this low, in order to avoid reentering the atmosphere too early, the Agena engine was reignited once every 7-10 days thereby raising the orbit and extending its life. As a result, the first "Big Bird" was aloft 52 days.

"Big Bird" is manufactured by the Lockheed Company of the United States. It "sprouts" two sharp eyes. One eye, developed by the Perkin-Elmer Corporation, is a very high-resolution camera purportedly capable of distinguishing individual people on the ground. The other eye, developed by the Eastman Kodak Company, is a reconnaissance camera employing a new film scanning device. "Big Bird" carried six returnable film canisters and can, at predetermined times and places, put the information it has picked up into the canisters and return them to earth; these are picked up in mid-air by an HC-130 aircraft fitted with retrieval gear based with the 6594th experimental wing stationed in Hawaii. They are then flown to Andrews Air Force Base just outside Washington. From there, they are forwarded to the National Photographic Interpretation Center.

"Big Bird" is still shrouded in mystery. Some people speculate that it carries some even more mysterious observation devices. One source has it that it has a four- or six-phase multi-spectrum camera capable of seeing through camouflage and measuring minute changes in a target. Another source says that it carries highly effective infrared scanning devices for night surveillance and can detect the heat emitted from protective underground missile silos. Still others claim that the "Big Bird" uses television equipment and side-looking radar and a 6.1-meter extensible antenna capable of transmitting the intelligence it has picked up to its ground station in the brief 10-minute interval it takes to pass over the station. These stations consist of seven land-based stations and six tracking ships. The seven land-based stations are located at New Boston, New Hampshire; Vandenberg Air Force Base in California; Wallops Island, Virginia; Kodiak Island, Alaska, Guam, the Seychelles in the Indian Ocean and a certain country in East Africa.

Even more astonishing is the fact that "Big Bird" often carries "passengers" aloft. The first "passenger" carried was on 20 January 1972, when "Big Bird" No 2 was launched. It carried the "P-11" satellite to conduct electronic surveillance. This 0.3 X 0.9-meter octagonal satellite weighed approximately 57 kilograms; its orbit was 472 X 549 kilometers.

On the average, two "Big Birds" are sent aloft each year. The second "Big Bird" flew for 40 days, the third "Big Bird" to the sixth "Big Bird" for 2 to 3 months and "Big Bird-7" for 123 days. The first to carry two satellites, "Big Bird-10," survived for 150 days. "Big Bird-14," launched on 27 June 1977, survived 178 days, almost half a year.

New Partner on Stage

As one "Big Bird" after another soared aloft, a new partner appeared on stage. This was the unusual launch that took place on 19 February 1976. A Titan 3D took off from the Vandenburg launch pad carrying a new spy

satellite into an orbit having a perigee of 247 kilometers and an apogee of 533 kilometers--twice as high as the ordinary "Big Bird." At first, it was categorized as a "Big Bird," but its unusual behavior made people suspicious. After 4 days, the orbit was changed to 341 X 535 kilometers and after 3 months it dropped to an orbit of 246 X 530 kilometers--a very strange bird indeed. This strange bird also carried two satellites, which had orbits of 236 X 535 kilometers and 253 X 531 kilometers respectively.

Simultaneously, it was discovered that the launching of this strange bird did not interrupt the flights of the "Big Birds." Six months later, "Big Bird-14" settled into an orbit of 155 X 239 kilometers. This was followed by "Big Bird-15" launched on 16 March 1978. Precisely 1 year later, on 16 March 1979, it flew into an orbit of 177 X 244 kilometers. It is said that the Americans plan to employ return-film satellites through the mid-1980s.

What, then, does this strange bird do? It turns out that it is a fifth-generation U.S. spy satellite developed by the TRW corporation with the code name "Project 1010," and a model designation of "KH-11."

Strategic requirements and technological progress are such that people are no longer satisfied with the film canister retrieval method and the untimely method of receiving commands from and relaying information to the ground stations [only while] above the stations. People hoped to directly and instantaneously (in real time) see the target under surveillance. Therefore, the goal of "Project 1010" was to research a satellite reconnaissance system that would be capable of real-time imagery. To this end, KH-11 carries high-resolution television cameras and uses data relay satellites in synchronous orbit to relay this imagery. This information does not need to be disseminated to ground installations but is beamed directly to the "National Photographic Interpretation Center" in Washington where it can be analyzed and judged immediately and conveniently. This tremendously enhances the surveillance level of the spy satellite and makes today's spy satellite a "trump card." Kampiles' unexpected selling of the secrets of this trump card was a great embarrassment to his bosses.

After the first KH-11 had been aloft for 2 years and 40 days (four times the life-span of the ordinary "Big Bird!"), it was commanded to descend and burn up by the ground.

Today, the second [such satellite] is aloft. It was launched on 14 June 1978 from Vandenberg Air Force Base. It is in an orbit of 285 X 470 kilometers with an angle of 96.9 degrees. Its information passes in an unbroken stream through data relay satellites, transmitted in real time to Washington and straight into the hands of the U.S. Central Intelligence Agency.

However, after the uproar of the Kampiles case, in the offices of the Operations Center Oversight Group there is certainly another handbook with updated contents and perhaps the spies of the KGB are in the process of obtaining it.

CSO: 4008

LIFE SCIENCES

NEW ADVANCES MADE IN STUDY OF EXCEPTIONAL HUMAN FUNCTIONS

Shanghai ZIRAN ZAZHI [NATURE JOURNAL] in Chinese No 8, Aug 80 p 606

[Article by Zhang Feng [1728 7364], reporter of the Journal]

[Text] Since the First Scientific Symposium on Exceptional Human Functions was held in Shanghai last February, there have been some advances in various places in the study of exceptional human functions.

At present, schools of higher education where this subject matter is being studied include Beijing University, Beijing Teachers College, Wuhan University, Lanzhou University, Hangzhou University, Anhui Teachers University, Jilin Teachers University and Jiamusi Medical College. Special subject Research Groups have been established in most of these institutions, and the subject matter has been listed in the official research plan. Participants in the research include professors, assistant professors, other instructors and researchers in the fields of physics, biology, psychology, physiology, medicine, Chinese traditional medicine, education, etc. The special subject group at Hangzhou University includes, aside from instructors of the university, Professor Dong Taihe [5576 1132 0735] of Zhejiang University and Professor Wu Xiecan [0702 3610 3503] of Zhejiang University of Medicine. The team in Jiamusi College of Medicine also receives the cooperation of such units as Harbin Industrial University, Harbin College of Shipbuilding, etc. The research group of the Institute of High Energy Physics Chinese Academy of Sciences has Xu Jianming [1776 1696 6900] as its chairman and Zhao Zhongyao [6392 1813 1031] as a consultant, and its members also include many famous scientists. Beijing University started to study the subject relatively earlier than the others. During the period of the May 4 Scientific Symposiums, a special report meeting on the subject of human exceptional interaction and functions was held, under the chairmanship of Professor Zhao Yibing [6392 0110 3521]. Many old scientists, such as Professor Wang Dezhaohao [3076 1795 2507], director of the Institute of Sonics Chinese Academy of Sciences, and Professor Zhao Zhongyao, deputy director of the Institute of High Energy Physics were invited to participate. Seven reports were read by Chen Shouliang [7115 1343 5328] Wang Chu [3769 2806] and He Muyan [6320 1970 0917], and were positively received by the specialists, invited and of the university, who were present at the meeting.

Some research groups have also been organized at the province and city level. The Shanghai Municipal Human Exceptional Functions Research Society was established on 21 July. The Beijing Municipal Research Group is participated in by related scientists of more than 20 units, including institutes of physics, biophysics,

high energy, psychology, etc. of the Chinese Academy of Sciences, etc. Jilin Province has established a cooperative group of research, with related persons of Jilin Teachers University, Baiqien University of Medicine, Changchun College of Chinese Traditional Medicine, the Institutes of Optical Instruments, Applied Chemistry, Chinese Academy of Sciences, and the Air Force Hospital, etc. participating, and with the secretary of Jilin People's Government Long Wenyu [7893 2429 1342] as the adviser.

Chungqing City has established a Human Exceptional Function Scientific Research Society, with scientists of Chungqing University, the Third Military University of Medicine, Chungqing College of Medicine, Institute of Laser, Institute of Radio, and Institute of Chinese Traditional Medicine participating. Yunnan Province established the provincial level Exceptional Functions Research Leadership Team, with Chief of the Provincial Bureau of Public Health Zeng Yusheng [2582 5148 3932] as the director, and comrades of Yunnan University, Yunnan College of Chinese Traditional Medicine, Kunming College of Medicine, Kunming Institute of Physics, and several hospitals all participate in this work. At present, a national human exceptional function research society is being prepared.

One very obvious characteristic of the scientific research on human exceptional functions in the various places in the past months is the fact that the key point of research has turned from verifying the existence of this type of functions to planned and purposeful observations and studies and experiments of various ways so as to look for the mechanism and principle. It is particularly significant that some units have begun to use modern scientific instruments to proceed with tests of children possessing such exceptional functions, and test of certain parts of their bodies have manifested some anomalies.

Professors Chen Shouliang [7115 1343 5328] and Wang Chu of Beijing University first suggested the problem of universality. That is to say that this type of exceptional functions must be to a certain degree universal among children of about 10 years of age and, moreover, they may be induced to produce. This [hypothesis] has been verified in many places. Last spring, Yao Hongjun [1202 7703 6874], an engineer of the automobile repair shop of the Jilin Provincial Bureau of Coal Industry, conducted an experiment at the dormitory and discovered that more than 30 children, including his own, all have this type of functions. Dong Zhenjun [5576 2182 0689] et al of the Department of Computer Science, Wuhan University carried out an experiment in one class of the third grade in the experimental elementary school of Wuhan University. Of the 57 students of the class, 12 students were at once discovered to possess such exceptional functions. In one class of Liuanlu Elementary School of Hefei City, 15 percent of the students were found to have exceptional functions. Sensory transmission, remote sensing, X-ray vision etc, which were originally regarded as rare functions have now been proved capable of being produced through induction and training.

Furthermore, the experiments carried out at Yunnan College of Chinese Traditional Medicine have disclosed that children with exceptional functions are often "Jingle sensitive persons." When this type of function is utilized to recognize images, the "transmission pathway" coincides more or less with the Jingle [meridians] in the Chinese traditional medical theory. From this discovery, it is proposed that the mechanism of human exceptional functions and the Jingle Theory may have a close

relationship. Hubei College of Chinese Traditional Medicine Hospital used medical instruments to examine the 105 patients who had been observed with "x-ray vision" by Xie Chaohui [6200 2600 6540] and produced results that basically coincide with the results of his exceptional function. A new aspect has thus been opened in the research on the applications of these functions. Currently, the work in this aspect is being continued.

Since February, through extensive propaganda and induction, many children (some adults) with exceptional functions have been discovered in various places. In such places as Shanghai, Nanjing, Tianjin, Zhejiang, Gansu, Jilin, Liaoning, Yunnan, and Nei Monggu where there had been no discovery of persons of exceptional functions, some have been discovered in all these places, most recently. One was discovered among the sailors of the navy as well. Most recently, it was discovered that some children can read books with their ears. When one of these children was told to "listen" to a certain line of a certain page of a certain book, he could "listen out" the words of that line. Even when the book is locked in a suitcase, he still can "listen out" the words of a certain line on a certain page of a certain volume. Dong Wenbao [5576 2429 6283], a member of the Huishui County Science Committee, discovered that he and his 5-year-old son have something which he calls a "thought transmission" function between them. That is to say when the father thinks about a number (maybe a multiple digit, an equation, or a letter of the alphabet) in his head, the son can feel it at the same time and write it out immediately. These strange discoveries are awaiting serious studies in the future.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

SCIENTISTS SUPPORT DISCIPLINARY ACTION IN BOHAI SINKING

Beijing GUANGMING RIBAO in Chinese 27 Aug 80 p 3

[Text] Correspondents Lu Jianming [7120 1696 2494] and Xie Jun [6200 6511] report that China's renowned bridge specialist and president of Tongji University, Li Guohao [2621 0948 6275], and the director of the Shanghai Institute of Silicates of the Chinese Academy of Sciences, Yan Dongsheng [0917 2639 3932], who is also a member of the Commission for Inspection of Discipline, have issued statements in support of the decision of the State Council concerning the Bohai No 2 accident.

Li Guohao said excitedly that the stern action taken by the State Council concerning the accident in which Bohai No 2 overturned and sank is extremely necessary. The large ship capsized and sank, and 72 persons died tragically. The leaders of the Ministry of Petroleum cannot evade responsibility, he told the reporters, recalling the fact that at a group meeting of the Second National Conference of the China Science Society, a delegate pointed out that the high indices previously proposed by the Ministry of Petroleum for petroleum industry development within a short period of time was not a factual or scientific approach. That delegate was immediately reproached by a deputy minister of the Ministry of Petroleum. That deputy minister said, arrogantly: "Don't keep stirring up muddy water. What we need is iron will and brave ambition. We never followed Li Siguang's [2621 0934 0342] theory to look for oil. Did we find it, anyway?" The delegates felt uncomfortable and they all said: "The leaders of the Ministry of Petroleum cannot bear to hear different opinions, even at a scientific meeting. Their authoritative attitude during ordinary times can easily be imagined." Li Guohao said: "The decision of the State Council, of course, does not concern the Ministry of Petroleum alone. It is meant as a warning for all antiscience bureaucrats in all departments. It is a guarantee for us to reorder our thoughts and attitudes to be in tune with the four modernizations. It is hoped that our leaders and cadres will pay more attention to the opinions of scientists, specialists, and the masses when they make decisions about important things, that they will do things according to scientific principles, and that they will think more about the interests of the people and will not spend human lives as if they were just "tuition."

Yan Dongsheng indicated to the reporters that he enthusiastically supports the decision of the State Council. He said: "The Bohai No 2 incident gave people a far-reaching lesson. The lesson is that the leaders of the Ministry of Petroleum regarded their own opinion as law and would not allow anyone else to present a different viewpoint. Therefore, they necessarily received the punishment of objective

principles and caused the state and the people to suffer heavy losses. If this patriarchal style of doing things is not changed, the four modernizations will have no hope. This sort of thing is not limited to the Ministry of Petroleum; it exists in other departments as well. The comrades of some departments do not do things from the viewpoint of objective reality and possibilities. They disregard the objections of technical specialists and casually make momentous decisions, causing people's labor and money to be wasted and unduly delaying our enterprises. For example, there have been construction projects with investments amounting to several hundred million or even several billion yuan, but after the structures were completed, there was no way to supply electricity, water, or raw materials. They just became useless packages. They must know that this investment capital is accumulated by the people, who have saved by eating and wearing less. This type of not appreciating the wealth created by the laboring people and throwing it away and wasting it is really very regrettable behavior. This sort of thing just cannot be allowed to continue.

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C30: 4008

SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

SCIENTISTS SHOULD HAVE LEADERSHIP ROLES IN RESEARCH WORK

Guangzhou NANFANG RIBAO in Chinese 22 Aug 80 p 2

[Article by Liang Jia (2733 OR57), party organization secretary and director of the Guangzhou branch of the Chinese Academy of Sciences: "Let Experts Have Leadership Authority Worthy of the Name"]

[Text] Currently, party leadership in scientific research units is being strengthened and improved, but the problem that urgently requires a solution is how to develop and utilize fully the function of specialists in scientific research work. Specialists are good, at scientific research work, and they should be allowed to have true leadership authority, to have the power to command, and to be real commanders in name as well as in reality. [The system] must be such so that where there is a job, there is authority and there is responsibility.

The Central Committee has clearly stipulated that a system of responsibility of directorship under the leadership of the party committee should be implemented in scientific research organizations. At present, organizationally, this leadership system has been carried out among the scientific research organizations belonging to the Guangzhou branch of the Chinese Academy of Sciences and the Guangdong Provincial Academy of Sciences, but to what extent the function of the skill of the specialist can fully be developed remains dependent upon a serious summarization of experience to be gained from practice. The skill of some specialists has not yet been fully utilized, and their forceful leadership in scientific research work has not yet been established in reality. According to my understanding, this condition is manifested in the following three forms: 1. The party committee has taken on too much. Nothing counts unless the party committee secretary nods his head. The director has no real power. 2. The specialists must participate in every type of work, regardless of its importance; in some cases they are even pushed to do whatever job there is. This condition makes it appear as if the function of the specialists is being fully utilized, but in reality specialists have become bogged down in housekeeping details and have no way to concentrate their efforts on doing a good job of guiding scholarship and managing scientific research. 3. Some are constantly picking at the specialists with regard to their work, their words, and their actions, and demanding that they be perfect; therefore, the specialists feel they must be very careful about everything, and they have no way to perform their work with full confidence. The above three situations amount to bondage, regardless of the subjective motivation. These situations prevent the specialists from giving free rein to the direction of scientific research.

I believe that if the function of the specialists cannot be fully utilized in any scientific research unit, or if the specialists cannot function fully in the matter of producing research results or of producing persons of talent, then the problem of strengthening and improving party leadership has not been satisfactorily resolved. If the party leadership is to be strengthened and improved, then the line, methods, and policies of the party must be seriously learned in accordance with reality, so that the work of political ideology and the correct style of the party are upheld and the socialist positive nature of the vast majority of scientific research persons, cadres, and workers is fully developed and they can contribute diligently to produce results, produce persons of talent, and achieve the four modernizations. In light of this content and this goal, a full development of the function of specialists is required by the policy of the party and is also necessary for scientific research; therefore, this should be an important aspect of strengthening and improving party leadership.

At present, in some scientific research units where the function of specialists cannot be fully developed, there is the major aspect of weak party committee work. The specific reasons are generally as follows: 1. Ideologically speaking, there is insufficient understanding of the importance of the leadership function of specialists in scientific research work. A few comrades are worried that the specialists cannot handle [leadership] and do not dare to hand over the power of command in research. 2. There is the aspect of habit—i.e., it is the habitual method of work to have the party take charge of everything. Some specialists also have the habit of asking the party committee for directions about everything and do not dare take charge. 3. With respect to specific measures, a set of measures and a system that will guarantee the practice of allowing the specialists to lead and command have not yet been formulated. A rear guard support system also should be strengthened, so that specialists will not have to worry about little things; otherwise, even if the problem of ideology is resolved, the work will not be carried out satisfactorily.

Besides, when specialists are to be assigned as directors, sufficient consideration must be given to those comrades who have special scientific and technological knowledge as well as organizational and leadership ability. If some specialists who have academic skill but no leadership ability are placed in positions of leadership, it would amount to forcing them to do what they cannot do. This would not be favorable for the development of their specialized skills.

For the purpose of strengthening and improving the leadership of the party, party workers in scientific research units must intensify their efforts on the problem of full development of the function of the specialists. Through tenacious work of political ideology and powerful measures, the party committee must generate the positive in the specialists to the fullest and help and support them in establishing true leadership and command authority in scientific research work, under the guidance of the party's line, policies, and goals and under the collective leadership of the party committee. At the same time, party workers must carry the party's work in political ideology to the work of business, so that in the minds of the scientists and technicians there is no wish to avoid problems but, instead, a continuous desire to use their special methods to resolve new problems that are forever coming up. This is where our responsibility lies.

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PUBLICATIONS

TABLE OF CONTENTS OF 'GAOFENZI TONGXUN' NOS 1-3, 1980

Beijing GAOFENZI TONGXUN [POLYMER COMMUNICATIONS] in Chinese Nos 1, 2, 3, 1980

[No 1, 1980 inside back cover]

[Excerpt] Papers

A General Method for Calculating the Mean Square Electric Dipole Moments and the Mean Square Lengths of Polymeric Chains.....He Fucheng [0149 4393 1004], Department of Chemistry, Chengdu University of Science and Technology (1)

The Primary Radical Termination in the Photopolymerization of Methyl Methacrylate.....Yu Tongyin [0060 0681 7148], Wang Lihui [3769 4539 1920] and Bu Haishan [0592 3189 1472], et al, all of the Department of Chemistry, Fudan University (10)

Terpolymerization of Epichlorohydrin, Ethylene Oxide and Propylene Oxide.....Xie Hongquan [6200 3163 3123], Zhu Jiang [2612 3068] and Liu Xiuxiang [0491 4423 3276], all of the Institute of Chemistry, Hubei Province (16)

Studies on the Lowering of the Spinning Temperature of Polypropylene by Adding 4-Hydroxy Tetramethyl-piperidine-1-oxyl.....Hou Xiaohuai [0683 2556 3232], Fan Yuxiang [2868 1342 4382] and Shen Dekang [3088 1795 1660], all of the Institute of Chemistry, Chinese Academy of Sciences (22)

The Morphology and Extension Behavior of cis-1, 4-polybutadiene Rubber.....Zhou Enle [0719 1869 2867], Xu Bailing [1776 4101 3781] and Jia Lianda [6328 6647 6671], all of Changchun Institute of Applied Chemistry, Chinese Academy of Sciences (27)

Characterization of the Structural Features of the Poly-p-phenylene Terephthalamide (PPTA) Films by the Light Scattering Method.....Hu Shiru [5170 0013 1172] and Xu Mao [1776 2021],

both of the Institute of Chemistry, Chinese Academy of Sciences (35)

Study on Birefringence of Biaxially Hot-Stretched Acrylics by Using Convergent Polarized Light.....Lu Xici [0712 6932 1964], Department of Modern Chemistry, Chinese University of Science and Technology; Luo Hezhang [5012 0735 3864], the Chemical Industrial Institute of Jinxi (45)

[No 2, 1980 inside back cover]

[Excerpt] Papers

Study of the Molecular Weight Distribution of the Epichlorohydrin Elastomer by Means of a Simple GPC Column.....Li Mianguai [2621 4875 6311], Fu Gongcheng [0265 0501 2052], Cao Haitian [2580 3189 3944] and Xie Hongguan [6200 3163 3123], all of the Institute of Chemistry, Hubei Province (65)

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AUTHOR: LYU Wenchao [0712 2429 6389]

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TITLE: " Properties of DJS-140 Computer System Introduced"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 3, 80 pp 6-9

ABSTRACT: The research of the DJS-140 computer system has been successfully completed in May 79 and its function and stability have been inspected and certified. It is now in the process of being manufactured by the factory. The computer system has a complete system hardware and software, with an extended storage capacity of 256KB, an 8-unit control terminal, magnetic disk, magnetic tape, a clock, a multi-path switching device. It is equipped with RDOS, MRDOS, and various languages (FORTRAN IV, FORTRAN V, ~~Multi-user~~ extended BASIC, extended ALGOL-60, etc.) Details of the hardware system, the operation system, and the language system are described.

AUTHOR: SUN Zhihui [1327 1807 2264]

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TITLE: "Program Language FORTRAN IV of the DJS Series Electronic Computers"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 3, 80 pp 25-27, 35

ABSTRACT: FORTRAN IV is provided in the system software of the DJS100 series of computers made in China. At present, the certified portion provided to the users is the 12K SOS system, with ISO FORTRAN IV as the standard and many extended functions in many aspects. The DJS100-FORTRAN programming characteristics are explained.

AUTHOR: HUANG Shuji [7806 2579 1015]
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TITLE: "On Microwave Range Finding"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese
No 3, 80 pp 36-38

ABSTRACT: Microwave range finding technique is now more than 20 years old, and with infrared and laser rangefinders, microwave rangefinder has become a tool commonly used in long distance distance measurement. China began to research on making microwave rangefinders in 1958. At present, several plants, research institutes, and schools of higher education have made several types and these products are being developed in the direction of miniaturization, solid state, and dynamic surveying. The technology, characteristics, and work theory of microwave rangefinders and their current condition of development are discussed.

AUTHOR: ZHENG Yixin [6774 0001 2450]

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TITLE: "Obvious Results of Reforming the Diffusion Furnace"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese
No 3, 80 p 13

ABSTRACT: High temperature diffusion furnace is a major equipment for the production of semiconductor devices. Due to its high power consumption, it was known as "electricity-eating tiger." Beijing Semiconductor Instrument Third Plant studied and carried out 2 reforms. First, the plant made a temperature control device to raise the control precision from $\pm 1^{\circ}\text{C}$ to $\pm 0.5^{\circ}\text{C}$, and added new insulating materials to replace the old. The constant temperature consumption rate was reduced from 3.7 kw to 3 kw. The second reform involved the adoption of the far infrared heating technique by changing the original pipe into a far infrared heating pipe. This change reduced the constant temperature power consumption from 3 kw to 1.8 kw.

AUTHOR: None

ORG: None

TITLE: "Front Cover Explained"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese
No 3, 80 pl, front cover

ABSTRACT: The front cover of this issue is a photo depicting the E3251-E3256 microwave frequency automatic displacement device. When it is combined with the E325 counter, it can automatically, quickly, and highly precisely measure microwave frequencies of 300MHz - 60GHz. The sensitivity of the instrument at 200 μ W is 300MHz - 12.4GHz; at 500 μ W it is 12.4-60 GHz. The degree of accuracy is 3×10^{-9} days.

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GSO: 4009

AUTHOR: HUANG Shiji [7806 0099 2623]

ORG: None

TITLE: "Developmental Trends in Color Television"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 2-5

ABSTRACT: At present the number of television sets in the world has exceeded 400,000,000 and 150,000,000 of these are color sets. Since color TV began to be broadcasted in USA in 1954, the number of color sets has grown continuously and this growth in production has necessarily promoted a rapid technological advancement. During this period, TV sets have gone through electron tube sets, to transistor sets, to integrated circuit sets. The degree of integration of color TV sets of today has become very high; aside from the tuner, the visual output, the travelling wave deflection, and power source adjustment, integrated circuits are used for all remaining. In Japan, the degree of integration has surpassed that of USA and Western Europe. An entire color set in Japan is now put together with 4-5 chips of medium scale integrated circuits (MSI); it is estimated in the future 1-2 chips of large scale integrated circuits (LSI) will be sufficient. The number of peripheral components has been reduced from the 800 to 300 now, and further reduction is expected. The rapid development from semiconductors to integrated circuits in color TV is reviewed. A list of Chinese names for various automatic circuits is attached

AUTHOR: JIA Shilou [6328 0013 2869]

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TITLE: "Carrier Wave Recovery Technique in Time-division Multiple-address (TDMA) Digital Satellite Communication"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 6-8, 22

ABSTRACT: In time-division multiple-address satellite communication, the carrier waves transmitted by the earth stations of various places are not coherent. With a frame cycle, a given receiving earth station receives carrier signals from other transmitting stations, and must be able to extract, quickly and accurately carrier signals of each station. At present, there are 2 techniques for recovering coherent signals of separate frames of each transmitting station: one is to use a fast locked phase loop or narrow band filter to trace and extract carrier signals of each station; the other is to use multiple locked phase loop to trace and extract carrier signals of various stations respectively. These methods are described in separate sections in the paper.

AUTHOR: WANG Xianggui [3769 4382 6311]

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TITLE: "Testing Large Scale Integrated Circuits"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 9-13

ABSTRACT: The history of development of integrated circuits indicates that improvement in circuit designing and the manufacturing technique as well as the testing and analysis of integrated circuits must be coordinated if integrated circuit technology is to develop rapidly. As the degree of integration is higher, the ratio of number of components and pins is further increased and the problem of testing is further complicated. While at the same time, the quality of the integrated circuits must be improved as well to present an even higher requirement for better testing techniques and instruments. This paper describes the available testing techniques and instruments. There remains a need to simplify the testing method and the equipment, however. The author believes that testing large scale integrated circuits is a complicated problem for which a satisfactory solution is not yet available here or abroad.

AUTHOR: LI Youhao [2621 0645 3185]
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ORG: None

TITLE: "Today's Permanent Magnetic Materials"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 18-19

ABSTRACT: Permanent magnetic materials supply constant magnetic fields to components without the need for additional energy; they are therefore important electronic and electrical materials. They are also expected to be extensively applied in transportation, ore selecting, and waste water treatment. In the past century, the property of permanent magnets has been improved more than 100 fold. Currently, 3 types are being used in large quantities: lead-nickel-cobalt permanent magnets, iron oxide permanent magnets, and rare earth cobalt permanent magnets. This paper describes advancements of the 3 major types of permanent magnetic materials separately and discusses the trends of development of these materials.

AUTHOR: HUANG Songru [7806 1529 1174]

ORG: Chengdu College of Telecommunication Engineering

TITLE: "Analysis of the Loop Transmission Function of Transistor Feedback Amplifier"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 25-27

ABSTRACT: It is known that the property of a negative feedback amplifier is determined by its loop transmission function $A_V B_V$ or $A_I B_I$. This paper proves theoretically that of a given negative feedback amplifier, as far as bipolar transistors are concerned, its loop voltage transmission function $A_V B_V$ equals its current transmission function $A_I B_I$. First the "dual network" method of Hakim, S.S. is improved to make it more suitable for general theoretical analysis of transistor negative feedback amplifier before the classic method is used to prove the equivalent relationship of the 2 types of loop transmission functions. Finally, applications of this relationship are explained.

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TITLE: "(1) Introducing China Made TTL Digital Integrated Circuit Products--(IV) Latch; (2) Recommending Two Types of New Materials"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 39-40

ABSTRACT: (1) Judging from the structure, Latch is a type of synchronous latch trigger, used mainly as a temporary register. In principle, anything that can utilize clock pulse action to store data in a trigger circuit may be used as a latch. A table is given listing 6 types of TTL intermediate speed, high speed, and very high speed latch products made in China. The circuit form, the work theory, the property characteristics, and the applications are discussed. (2) Two types of new materials recommended in this short item includes: (a) 160 denatured aluminum alloy, a possible substitute for brass: When it is used in the place of brass to make electronic components, corrosion preventive measures may be eliminated, the weight of the product is reduced so is the cost. The material may be supplied by Northeast Light Alloy Refining Plant. (b) A conduction adhesive to replace silver or aluminum solder iron: It is made by Shanghai Synthetic Resin Institute. Problems of deformation, corrosion, etc. of soldered parts may be resolved with this adhesive. Major technical indices of the glue are given.

AUTHOR: LIU Zuolin [0491 0155 7207]

ORG: None

TITLE: "Using Red Slush to Make Silicon-Calcium Complex Fertilizer"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80
p 19

ABSTRACT: Red slush is the waste slag of the aluminum refining process. Using it to make fertilizer is a new way of resolving the problem of disposing it as well as providing agriculture a new source of fertilizer. It contains a large quantity of silicon and calcium, and other elements and trace elements useful for the growth and development of plants. It contains less than 2 PPM of harmful cadmium, less than 0.1 PPM of mercury, less than 0.01 percent of nickel, and less than 0.02 percent of chromium; therefore, all these harmful contents are below the regulated limit for farm fertilizer. The slurry should first be dehydrated and then dried in a low temperature oven of 120°-300° C to activate before grinding. This is all it is required to make it into fertilizer. Field tests have proved its effectiveness in promoting the growth of crops, strengthening their adversity resistance, and reducing soil acidity. It is good for rice, wheat, corn, peanuts, and melons alike.

AUTHOR: XIANG Shunji [7309 7311 4764]

ORG: None

TITLE: "Reclaiming Gold From the Cyan-containing Liquid Waste of Gold Plating"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80
pp 20-21

ABSTRACT: In the gold plating process, pure gold is generally dissolved in a potassium cyanide solution to form aurous potassium cyanide, in which gold plating is accomplished. Afterwards, the solution is turned into a liquid waste containing gold and cyan. This paper describes 2 ways, the scorching method and the metal substitution method, of reclaiming crude gold from this liquid waste. The process of refining the crude gold is also told.

AUTHOR: GU Dingyan [7357 7844 6056]

ORG: None

TITLE: "Efflux Aeration Treatment of Waste Water of Textile-dyeing Process"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80
pp 22-24

ABSTRACT: Anlu 57 Cotton Spinning and Weaving Plant of Hubei Province used an efflux aeration tank of activated mud to treat the waste water of the dyeing process of knitted textiles. The technique was officially in operation in Oct 77. Since then, it has proved to have stable effect. The tank is easily maintained and the work process is simple. The waste water contains soda, organic matter of cotton fibers, dyestuff, activating agent, and detergent. After treatment in the tank, the water is found to meet the standard for disposal. The structure of the tank and the treatment procedure are described.

AUTHOR: None

ORG: Ozone Research Team, Environmental Engineering Teaching and Research Group, Qinghua University

TITLE: "Ozone Oxidization Method of Deep Treatment of Liquid Waste of Oil Refining Process"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 pp 27-29

ABSTRACT: Beijing Dongfanghong Oil Refinery treated its waste water in 2 stages of flotation and aeration. The resultant water had a better quality than the industrial wastes disposal standard of the state, but did not reach the quality standard of ground surface water, neither was it good enough to be used again for oil refining. A third stage of ozone oxidization was therefore adopted. Small and intermediate tests proved that with the third stage treatment, the water quality may reach, or be close to the standard for ground surface water. Compared with techniques of activated charcoal absorption, electrochemistry, and thin film, the ozone oxidization has the advantages of being fast reacting, free of secondary pollution, free of transportation and storage problems, easy to control and adjust, and simpler. The procedure and required equipment are described.

AUTHOR: ZHAO Ruifu [6392 3843 1133]

ORG: None

TITLE: "Remote Sensing Monitoring of Petroleum Pollution of the Oceans"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 pp 30-32

ABSTRACT: Many materials on the earth reflect and absorb the sunlight at a given frequency and produce an electromagnetic radiation to form a wave spectrum signal related to the characteristics of a given material. For this reason, when the signals received by a remote sensing detector are analyzed, different types of materials may be distinguished. This paper explains how ultraviolet remote sensing, visible light remote sensing, heat infrared remote sensing, microwave remote sensing, or laser fluorescence remote sensing can be used to monitor the condition of oil pollution of the oceans. Merits and shortcomings of these techniques are discussed.

AUTHOR: HAO Dwen [6787 1795 2429]

ORG: None

TITLE: "Several Problems in the Assessment Aspect of Heavy Metal Pollution of cropland"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 pp 36-37, 35

ABSTRACT: Problems of assessing heavy metal pollution of farm land are discussed in the paper in 3 parts: The first part deals with the problem of natural content of heavy metals of soils and crops. Heavy metal contents of soils and crops vary from place to place to cause it to be difficult to determine the base or non-polluting level. The second part deals with the various degrees of heavy metal pollution. In the early stage of soil pollution, there is generally no physiological effects on crops and there may be no yield reduction. The degree of pollution is expressed in the complex relationship between the soil and the cropplant and the rate of yield reduction may be used as one of the indicators only. The third part deals with equations used for computing the pollution index of individual heavy metal and those used for computing compound pollution index of soil and crops.

AUTHOR: ZHANG Heng [1728 1854]

ORG: None

TITLE: "A Bionic Agricultural Drug--Shachongshuang"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 pp 43-44

ABSTRACT: Guizhou Provincial Institute of Chemical Engineering Research succeeded in making Shachongshuang. It belongs to the clam-worm toxin type insecticide, a bionic drug. Skin and mucous membrane tests on white mice and rabbits disclosed no harmful effects on the animals. When it was used to control hog lice, the skin of the hog showed no damage whatsoever and the hog did not stop feeding. Tests also showed that the drug did not accumulate in the body of the treated animal. Nationwide tests in 21 provinces and cities demonstrated it to be an effective insecticide on more than 50 pests of rice, corn, wheat, soybean, rape, fruit trees, and sugar beets. Under normal conditions, only 50-75 g of the drug per mu in dilution for one spray is needed to produce good results. At present, about 20 plants in the country are preparing to manufacture it.

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CSO: 4009

Quality Control

AUTHOR: None

ORG: Crankshaft Section, Beijing Internal Combustion Engine General Plant

TITLE: "Let Old Equipment Wakens Up Their Fresh Capability by Means of Quality Control"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 1, Feb 80 pp 8-11

ABSTRACT: This article reports how an old quadric crank rough-processing tool of Beijing Internal Combustion Engine General Plant, has reduced its diesel engine crankshaft rejected products from 29.77% of October 1978 to 14.24% in June 1979 through exhaustive quality control analysis, and corrections. The main reason of the rejection was found to be that the crankshafts were not round due to mechanical defects. The process of the quality control analysis introduced includes: 1) finding of existing key problems by study by all levels concerned; 2) ascertaining of the causes of the problems; 3) the singling out of the more influential factors; 4) the making of counter-

[Continuation of ZHILIANG GUANLI No 1, Feb 80 pp 8-11]

measure plans; 5) the execution of the plan; and 6) the final checking of the results.

AUTHOR: None

ORG: Spark Plug Workshop Die-casting Section, Nanjing Insulator Plant

TITLE: "Enhancing of Product Quality from Execution of Scientific Control"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 1, Feb 80 p 13

ABSTRACT: This article introduces the experience of how the die-casting section of the Spark Plug Workshop of the Nanjing Insulator Plant had applied scientific control to improve the quality of their products. On the basis of strengthening the constructiveness, self confidence and sense of responsibility of workmen at all levels to participate in the management, and enthusiasm of learning modern advanced experiences, six "must be done" are developed to ensure good quality, namely: 1) timely calculation of quality index performance; 2) analysis of quality and performance; 3) insistence of quality priority; 4) strict control of working conditions; 5) refuse die-casting to specified conditions; and 6) attain satisfaction to all concerned.

AUTHOR: GAO Fenglin [7559 7364 2651]

ORG: This Journal

TITLE: "Investigation on Process Capability and Machinery Capability"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 1, Feb 80 pp 10-24, 11

ABSTRACT: This article introduces the general knowledge concerned with the investigation of process capability and machinery capability that includes: 1) the definition of process capability and machinery capability; 2) the collection of data for process and machinery capability investigation, and how to judge process conditions; 3) calculation of process capability and machinery capability; and 4) judgement and treatment of process capability. Other articles in this concern will be continued.

AUTHOR: None

ORG: This Journal

TITLE: "Quality Control is Technical Innovation"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 1, Feb 80 pp
25-26, 32

ABSTRACT: This article is a translation from a Japanese author by Dung
Mu [0392 2606]. Starting from the advances to jet airplanes, the
article discusses the conditions of technical innovations, and the
coincidence of quality control to the conditions.

AUTHOR: WANG Hu [3769 3725]

ORG: Harbin Cement Plant

TITLE: "Ring-Chain-Guarantee in the Industrial Production of Cement"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 3, Jun 80 p 7

ABSTRACT: The author analyzes how the Harbin Cement Plant has advanced since the last two years adoption of a quality control system. Based on strict analysis and examination of the finished products, assurance of ample raw material supply, and adoption of large flow processing, a ring-chain-guarantee system was developed that coordinated the eight key links of the production chain to attain process equilibrium, quality guarantee of each link, prior-control of raw material quality, checking of quality fluctuations, adoption of PDCA cycle, and efficient information transference. One of their product, the "Swan" brand cement, was commended by the State Council in 1979. The plant was founded during the Japanese-occupied Manchuria era.

AUTHOR: YUE Guang [2588 0342]

ORG: This Journal

TITLE: "All Enterprises are Stirring Up to Put the 'Provisional Law' into Execution"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No Jun 80 p 13

ABSTRACT: This article reports how the entire nation is actively supported the "Industrial Enterprise Comprehensive Quality Control Provisional Law" enacted by the State Economic Commission in March 1980. The supports cited include promotion of quality control conferences, plannings and education throughout all levels of industrial enterprises, and some achievements attained so far. The provisional law was drafted on the basis of quality control experiences of Chinese industrial enterprises during the last 30 years with due references to the modern advanced systems and methods abroad to meet the requirement of comprehensive quality control systems and methods in China.

AUTHOR: CAI Guoan [5591 0948 1344]

ORG: Xian City Economic Committee

TITLE: "Education on Quality Control in Xian City Achieved Primary Success"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 3, Jun 80 p 23

ABSTRACT: The promotion of overall quality control system by the Xian Economic Committee has spread fundamentally to every staff of all experimental point enterprises by the end of 1979. The program is characterized by its initial education among party and administrative leaderships, training of experimental point core members, compiling and popularizing of educational materials specific to the characteristics of different industries, and paying special attention to experimental points

AUTHOR: None

ORG: Technical Information Office of National Capital Iron and Steel Mill

TITLE: "Application of Analytical Methods in Quality Control"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 3, Jun 80 p 25

ABSTRACT: This is an excerpt translation of an article originally published in the Japanese journal "Standardization and Quality Control" No 1, 1979. The article reviews the ever increasing application of such analytical methods as orthogonal imaginery lines diagrams, probability correspondence, and accumulation method, in addition to the conventional statistical methods, in studies of quality control. Also, the advent of electronic computers have facilitated the study of many theoretical problems usually encountered in quality control.

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